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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/529,017      | 09/22/2005  | Daniel K. Lau        | 102412-108          | 8812             |

27267 7590 10/30/2006

WIGGIN AND DANA LLP  
ATTENTION: PATENT DOCKETING  
ONE CENTURY TOWER, P.O. BOX 1832  
NEW HAVEN, CT 06508-1832

EXAMINER

DANG, PHUC T

| ART UNIT | PAPER NUMBER |
|----------|--------------|
|----------|--------------|

2818

DATE MAILED: 10/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                 |              |  |
|------------------------------|-----------------|--------------|--|
| <b>Office Action Summary</b> | Application No. | Applicant(s) |  |
|                              | 10/529,017      | LAU ET AL.   |  |
|                              | Examiner        | Art Unit     |  |
|                              | PHUC T. DANG    | 2818         |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on election filed on September 20, 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) 14-25 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10, 12 and 13 is/are rejected.
- 7) ☒ Claim(s) 11 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 September 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some    \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>031306</u>  | 6) <input type="checkbox"/> Other: _____                          |

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### **DETAILED ACTION**

1. This application is a 371 of PCT/US03/29569 filed on September 23, 2003 which claims benefit of 60/415,189 filed on September 30, 2002.

### **Election/Restrictions**

2. Applicant's election with traverse of Group I (claims 1-13) filed on September 20, 2006 has been acknowledged.

In the Applicant election's argument, Applicants urge that claims of either group is required a search for subject matter relating to housing for semiconductor.

The traversal is not found persuasive because the fields of search for method and device claims are NOT coextensive and the determinations of the patentability of method and device claims are different, that is process limitations and device limitations are given weight differently in determining the patentability of the claimed inventions.

Also, the strategies for doing text searching of the device and method claims are different. Thus, separate searches are required.

The requirement is still deemed proper and is therefore made **FINAL**.

### **Oath/Declaration**

3. The oath/declaration filed on September 22, 2005 is acceptable.

### **Information Disclosure Statement**

4. The office acknowledges receipt of the following items from the applicant:  
Information Disclosure Statement (IDS) filed on March 13, 2006.

### **Specification**

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5. The specification has been checked to the extent necessary to determine the presence of all possible minor errors. However, the applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

### **Claim Rejections - 35 USC § 102**

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1, 4-8 and 12-13 are rejected under 35 U.S.C. 102 (b) as being anticipated by Shim et al. (U.S. Patent No. 6,534,859 B1).

Regarding claim 1, Shim discloses a device comprising:

a substrate (40) having first and second generally opposite surfaces, the substrate (40) first surface having a plurality of bond sites (48) disposed thereon;

a die (42) mounted to the first surface of the substrate (40), the die (42) having first and second generally opposite surfaces parallel to the substrate (40) first and second surfaces, the die (42) first surface having a plurality of I/O pads (50) disposed thereon, the I/O pads (50) being electrically connected to the bond sites (48);

a molding compound (56 & 57) encapsulating the die (42) and at least the first surface of the substrate (40);

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a heat spreader (60) at least partially embedded in the molding compound (56 & 57) and having a peripheral cut edge portion aligned with and not recessed from associated peripheral cut edge portions of the substrate (40) and molding compound (56 & 57) [Figs. 1-6].

Regarding claims 4-8, Shim et al. disclose the spreader (60) is set on the substrate (40) with the die (42) and the compound (56 & 57) as shown in Figs. 1-6.

Regarding claims 12-13, Shim et al. disclose a wire connection (52) between the I/O pad (50) and the bond sites (48) [Fig. 6].

### **Claim Rejections - 35 USC § 103**

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shim et al. in view of Djennas et al. (U.S. Patent No. 5,734,201).

Shim et al. disclose the features of the claimed invention as discussed above, but do not disclose where the heat spreader (60) has first and second generally opposite surfaces parallel to the die (42) first and second surfaces, the heat spreader (60) second surface being covered by the molding compound (56 & 57) and the heat spreader (60) first surface being uncovered by the molding compound (56 & 57).

Djennas et al., however, disclose the heat spreader has first and second generally opposite

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surfaces parallel to the die first and second surfaces, the heat spreader second surface being covered by the molding compound and the heat spreader first surface being uncovered by the molding compound [Fig. 4].

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the teaching of Shim et al. as taught by Djennas et al. such that the heat spreader has first and second generally opposite surfaces parallel to the die first and second surfaces, the heat spreader second surface being covered by the molding compound and the heat spreader first surface being uncovered by the molding compound for a purpose of improving a semiconductor device.

8. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shim et al. and Djennas et al. in view of Asano et al. (U.S. Patent No. 5,929,516).

Shim et al. disclose the features of the claimed invention as discussed above, but do not disclose the heat spreader is thermally connected to the die by a material having a thermal conductivity higher than a thermal conductivity compound.

Asano et al., however, disclose the heat spreader is thermally connected to the die by a material having a thermal conductivity higher than a thermal conductivity compound [col. 2, lines 51-54].

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the teaching of Shim et al. and Djennas et al. as taught by Asano et al. such that the heat spreader is thermally connected to the die by a material having a thermal

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conductivity higher than a thermal conductivity compound for a purpose of improving a semiconductor device.

9. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shim et al. in view of Maslako et al. (U.S. Patent No. 5,483,740).

Shim et al. disclose the features of the claimed invention as discussed above, but do not disclose the substrate is a metallic lead frame.

Maslako et al. et al., however, disclose the substrate is a metallic lead frame [col. 5, lines 7-10].

It would have been obvious to one having ordinary skilled in the art at the time the invention was made to modify the teaching of Shim et al. as taught by Maslako et al. such that the substrate is a metallic lead frame for a purpose of improving a semiconductor device.

10. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shim et al. in view of Going et al. (U.S. Patent No. 6,271,579 B1).

Shim et al. disclose the features of the claimed invention as discussed above, but do not disclose the substrate comprises a dielectric material having first electrical conductors disposed thereon, the first electrical conductors being selected from at least one of electrically conductive traces, layers, vias, pins, and combinations including one or more of the foregoing.

Going et al. et al., however, disclose the substrate comprises a dielectric material having first electrical conductors disposed thereon, the first electrical conductors being selected from at least one of electrically conductive traces, layers, vias, pins, and combinations including one or more of the foregoing [col. 2, lines 10-16].

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It would have been obvious to one having ordinary skilled in the art at the time the invention was made to modify the teaching of Shim et al. as taught by Going et al. such that the substrate comprises a dielectric material having first electrical conductors disposed thereon, the first electrical conductors being selected from at least one of electrically conductive traces, layers, vias, pins for a purpose of improving a semiconductor device.

#### **Allowable Subject Matter**

11. The following is a statement of reason for the indication of allowable subject matter:

Claim 11 is objected to as being dependent upon a rejected base claim, but would be allowed if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

None of the prior art of records disclose an array of second electrical conductors electrically coupling the substrate to an external circuit, the second electrical conductors being selected from at least one of solder balls, solder bumps, solder paste, pins, and combinations including one or more of the foregoing.

#### **Conclusion**

12. This application is in condition for allowance except for the presence of claims 14-25 directed to an invention non-elected with traverse in the reply filed on September 20, 2006.

Applicant is given ONE MONTH or THIRTY DAYS from the date of this letter, whichever is longer, to cancel the noted claims or take other appropriate action (37 CFR 1.144). Failure to take action during this period will be treated as authorization to cancel the noted claims by Examiner's Amendment and pass the case to issue. Extensions of time under 37 CFR 1.136(a)

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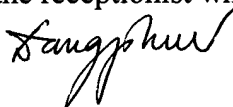
will not be permitted since this application will be passed to issue. The prosecution of this case is closed except for consideration of the above matter.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phuc T. Dang whose telephone number is 571-272-1776. The examiner can normally be reached on 8:00 am-5:00 pm.

14. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Harvey O Minsun can be reached on (571) 272-1835. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306 for regular communications and Final communications.

15. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Phuc T. Dang



Primary Examiner

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